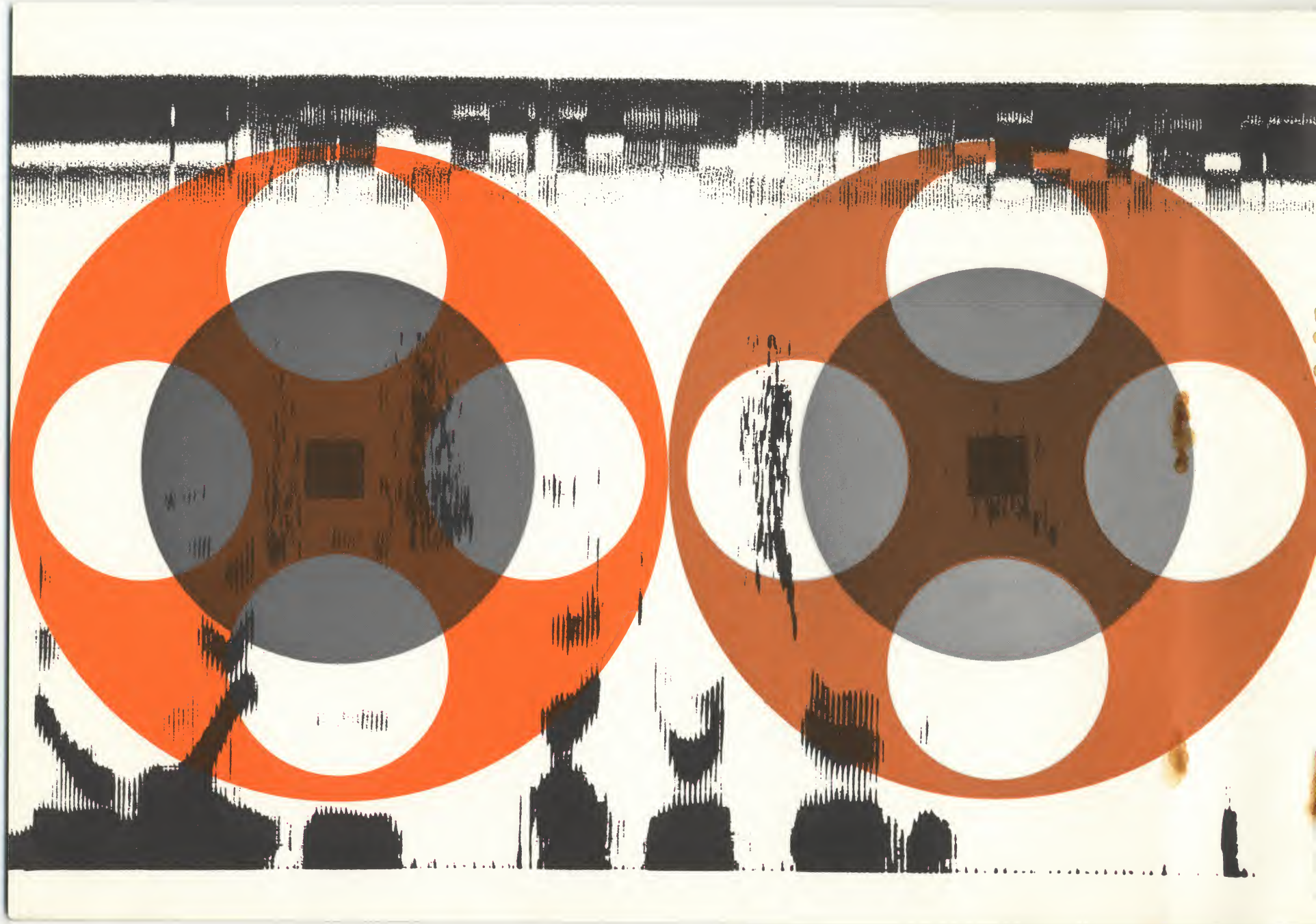
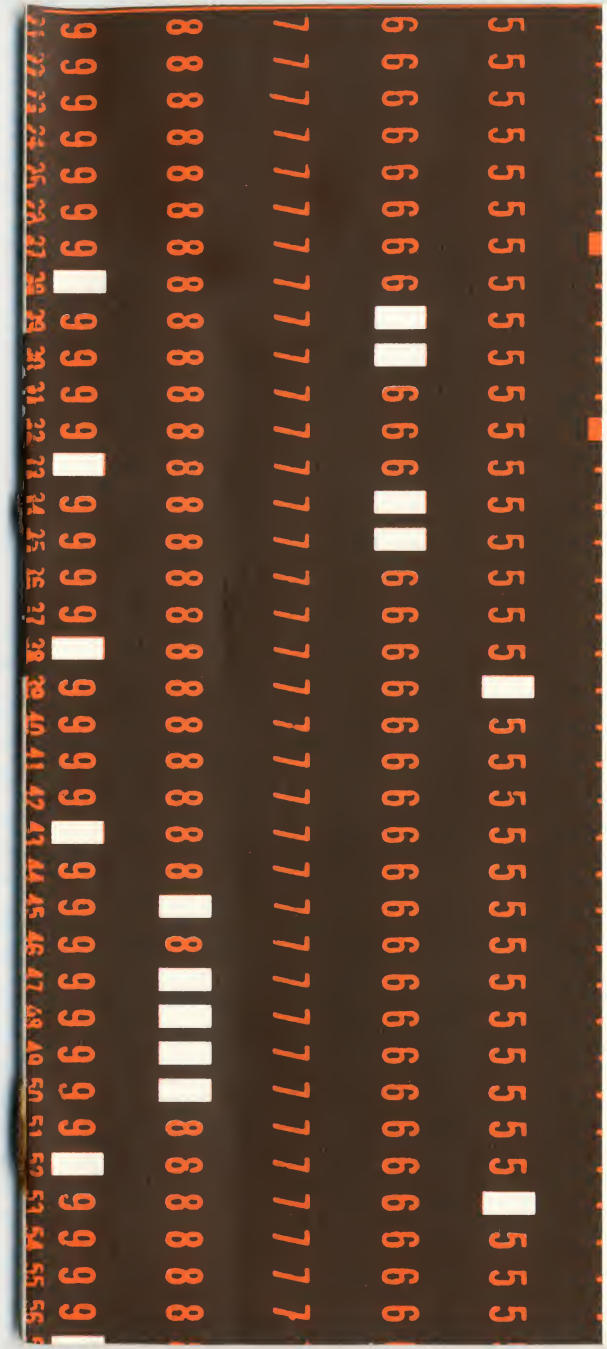
DATA:

STRANGE NEW "VOICES" AT YOUR SERVICE









On the cover are two unusual patterns. The upper pattern shows what the sound of a human voice looks like as it's being conducted through a Bell System telephone circuit. The pattern below it depicts the "voice" of a business machine—also using a telephone circuit.

Within the next 15 years, business machines are expected to exchange more information via telephone systems than will people. DATA-PHONE and other new data services will make it possible.

Simply put, a DATA-PHONE data set converts electrical impulses—binary digits or "bits" of information received from a business machine—into audio tones. After a telephone connection is dialed, a data set transmitter sends these tones through a circuit just as the human voice is transmitted. A data set receiver reconverts the tones into impulses that are fed into a waiting business machine for data-processing purposes.

Some data sets can handle as many as 2,500 words per minute on regular telephone lines. Despite this speed, and the complexity of the material sent, making a call with DATA-PHONE service requires no more effort or skill than making an ordinary telephone call.

Having started network DATA-PHONE service in 1958, the Bell System had about 2,000 DATA-PHONE data sets in service as of January 1, 1962. At the end of August, another 54,000 data sets were installed for the new TWX mechanization program. About 100,000 sets are expected to be transmitting business machine messages by 1965.

Western Electric manufactures a number of different data sets. Sets, for example, are designed to accept data for transmission on plain message paper, on punched paper or magnetic tape, or on perforated business forms. Data may be stored at the receiving end or fed directly into a computer.

Some day, according to Bell System planners, DATA-PHONE service will assume a variety of domestic chores, allowing us to pay bills by telephone, or remotely operate certain household appliances regardless of distance.

Because they will touch our lives in so many ways, DATA-PHONE services promise to become one of the most useful developments in communications since the first telephone call 86 years ago.





3

SECOND SERVICE

It may take time before your home telephone includes DATA-PHONE service equipment. But, in the hands of others, data sets are already at your service. They may help you get important, far-away information about an insurance policy or a travel reservation. And you can receive the information you need a lot faster and easier than before.

For example, American Airlines, booking about 40,000 passenger reservations daily, is banking heavily on a new private-line communications system linked by data sets. Called SABRE, this system is able to reserve flight space for passengers in THREE SECONDS or LESS!

By 1964, when in full operation, SABRE will circulate data about nearly 400 daily flights between and among some 56 U.S. cities. Here's how data sets will help make SABRE's speed possible on a nationwide basis.

A ticket agent, in any part of the country, will be able to press a button on a console, thereby requesting a flight reservation. Electrical impulses will feed from the console into a data set, where they're converted into audio tones. In a wink, the

tones will be sent humming across leased lines to a processing center at Briarcliff Manor, near New York City. There, another data set will reconvert the signals into impulses and forward them to a computer. The computer will search its memory for the answer to whether space is available on that flight and will send the answer back over the same path to the inquiring airline ticket agent. From initial inquiry to receipt of an answer, the elapsed time is three seconds or less.

Assume that New York City, Hartford and Boston are assigned to one of SABRE's high-speed data lines. (Actually five or six major cities may share the same one.) The computer at Briarcliff signals the farthest city, Boston, to begin transmitting. Boston sends data stored during the last second or two, including that collected from surrounding New England offices.

After Boston has completed its transmission, the next city down the line, Hartford, is signalled to begin transmitting. When Hartford finishes, New York is signalled to send. Data sets will permit SABRE to complete the entire cycle in a matter of seconds. Boston is then signalled to begin transmitting again. All the communication lines are fully "duplexed," which means that data and control messages can be transmitted in both directions simultaneously.

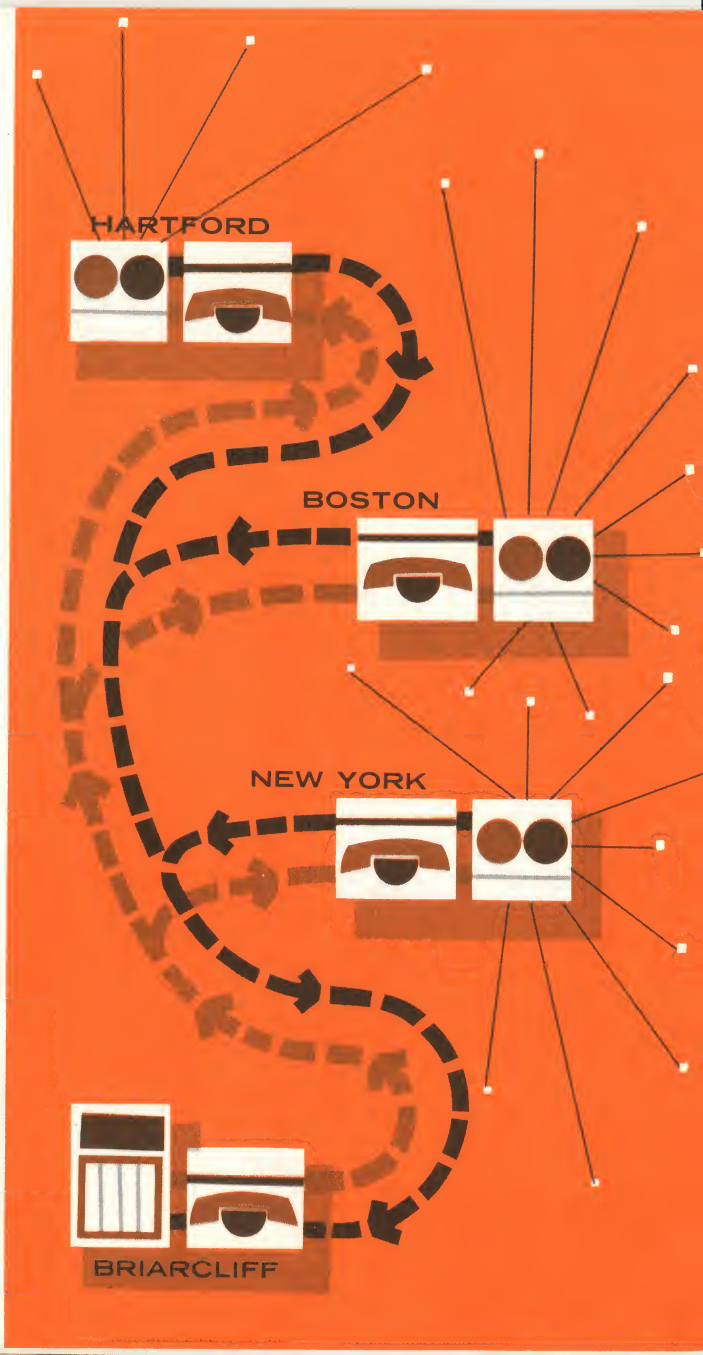
Because of the speed at which data sets work, information can also be made available immediately to:

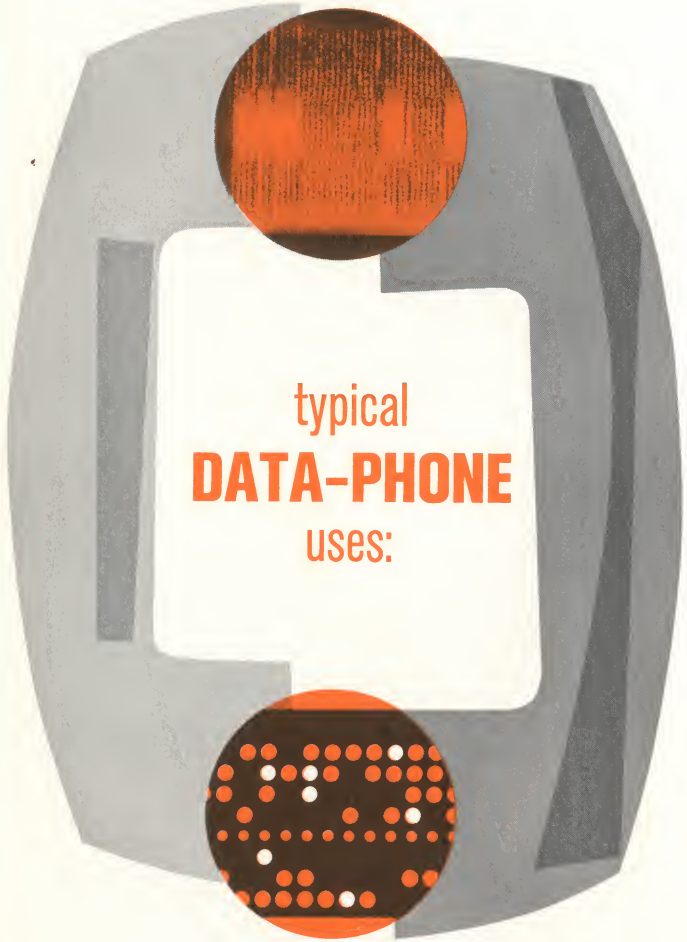
- Reserve space on board return flights that may originate thousands of miles away. Lengthy delays in reserving return-flight space were often experienced in the past. Now, passengers receive out-bound and return-flight reservations at the same time.

- Answer a catalogue of questions, such as whether Aunt Kate was aboard a delayed flight. Requested by data set, the computer will supply Aunt Kate's full name (if she's on board), similarly spelled and like-sounding names, or the entire passenger list of the flight.

- Fill requests from Teleticketing customers. Teleticketing is an airline service whereby a company requesting flight space for employees may receive the plane tickets via teletypewriter and data set equipment installed in the company's own office. Teleticketing eliminates the cost and delay of messenger service.

- Furnish important flight progress data, like the exact time a plane will depart or arrive at each of the cities served by American.





typical DATA-PHONE uses:

INSURANCE

To over 50,000 policyholders of Hardware Mutuals-Sentry Life Insurance Company, DATA-PHONE service means speedier payments on insurance claims, among other advantages. Hardware Mutuals estimates that DATA-PHONE service saves one million dollars in annual operating costs.

SOCIAL SECURITY

Offices in six major cities already use high-speed data sets to exchange information with the Social Security Administration's computer center in Baltimore. Some 600 smaller branch offices, with less data traffic, form a nationwide network of lower-speed data sets. This will help pensioners receive their benefit payments faster, more accurately than ever before.

HANDWRITING

Facsimiles of signatures can be transmitted by DATA-PHONE service and appear instantly on a business machine across town or in another city—a development of interest to lawyers, bankers, stock brokers, law enforcement officers and others who need fast transmission of handwriting. Handwritten charts and graphs can also be transmitted in this way.

MEDICAL USES

DATA-PHONE sets have experimentally transmitted the pattern of a heart pulse hundreds of miles—even during an actual operation—for immediate expert analysis. Sets designed to send and receive "live" electrocardiographs may be available to hospitals and heart specialists in the not too distant future.

DISTRIBUTION

Ordering procedures are also being speeded up. By arranging for distributors to order with data sets, R.C.A.-Whirlpool has reduced delivery time on washing machine parts from two weeks to as little as one and one-half days.

CREATIVE NEW USES

Creative new uses are being found for DATA-PHONE service every day. One customer, a major oil company, may link its ocean-going ships with a landlocked computer in order to speed the exchange of transportation and payroll data. Oil companies, restaurants, hotels and department stores may use DATA-PHONE service to provide a rapid check on the authenticity of customers' credit cards. There seems no end to the variety of applications of DATA-PHONE service.

PUTTING DATA-PHONE SERVICE TO WORK AT W. E.

In addition to manufacturing data communications equipment for subscribers in every walk of business and industry, Western Electric has been putting this equipment to work in its own operation for several years, and has actually pioneered a number of uses.

The Company recognized a need to apply its own equipment to internal data bottlenecks that were developing as business activity increased—suddenly and sharply—at the end of World War II. The growing volume of material W. E. stocked and distributed at that time began to tax its recordkeeping system. Early-model computers, designed to deal with this rising tide of paperwork, processed Company records efficiently enough. But W. E. still needed a more rapid, economical way of getting data to the new data-processing machines it had recently put to use.

In 1960, after many months of testing, Western Electric engineers developed a new data set and related equipment to meet this need. With this equipment, telephone company employees could prepare data for processing, while ordering material from a W. E. distributing house, more quickly and easily than ever before.

Western Electric's network of data sets is expanding in operation between distributing houses and manufacturing locations as well as between the houses and Telephone Company store rooms.* At the same time, automated billing procedures, sales analysis, payroll and statistical reports are rapidly increasing the use of this inter-company service. A great many more pencils and forms, file records and message copies will become obsolete as DATA-PHONE service continues to improve service and cut operating costs within the Bell System.



*To date, Westchester, Cleveland, Syracuse, Seattle and Illinois Distributing Houses maintain DATA-PHONE service with Telephone Company stockmen. All 34 W. E. Distributing Houses use data sets with card readers to order material from the Indianapolis Works, the Supplies Service organization and Teletype Corporation, a W. E. subsidiary.



HERE'S ONE WAY W. E. PUTS DATA-PHONE SERVICE TO WORK



■ More and more telephone company stockmen, at supply locations, can order material through DATA-PHONE service. After reviewing inventory needs for the next day, a stockman dials the distributing house in his area. A steady "b-e-e-p" tells him to lift an exclusion button at the top of his data set. This connects his card reader via data set with similar equipment at the distributing house. The punched cards he then feeds into a "reader" device contain essential data needed in ordering.



■ Although the card receivers can operate while unattended, a distributing house attendant keeps each set supplied with punched cards. Data received from the stockman is stored on these cards. If the data is received correctly, a steady tone is automatically returned to the stockman. If not, a broken tone tells him to re-order. Average orders are transmitted within three minutes. A stockman can return the telephone circuit to voice communications and discuss his order with the attendant by pressing the exclusion button down.

■ Requisition slips are printed from data stored on the punched card. Data includes the stockman's name and address, the number and description of each item ordered, its warehouse location and special instructions (e.g. "DO NOT SUBSTITUTE"). The requisition, itemizing the stockman's order, is transferred to the warehouse area within half an hour after the order arrives via DATA-PHONE service. The punched card is filed until the telephone company returns a copy of the requisition. Then both forms are compared for accuracy in the billing operation.

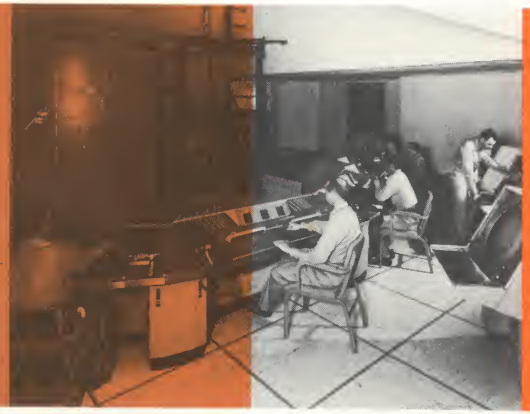




■ Warehousemen receive the stockman's order immediately after it is printed. The requisition is attached to a hamper and sent along a conveyor belt to where the material on order is located. The items are selected. At the end of the conveyor belt, Telephone Company employees make sure that the material selected conforms to the material that has been requisitioned both in kind and in number.



■ An average of over 500 orders are received between 6:00 PM and midnight at one W.E. Distributing House—Illinois. The orders come from over 150 Illinois Bell Telephone Company supply locations, mostly in the Chicago area. Illinois Bell trucks leave the distributing house with some 40 tons of material by 9:00 the next morning. Telephone Company stockmen receive the supplies just before making their daily rounds of installation-and-repair lockers.



HOW DATA-PHONE AND OTHER DATA SERVICES DEVELOPED

At least 100 years separate current innovators from the pioneers of some of the principles that govern data communications. A mid-Nineteenth Century mathematician, George Boole, applied algebraic symbols to logic, thereby permitting Twentieth Century engineers to design simpler, less expensive logical circuits than would otherwise be possible. In 1948, Claude E. Shannon, a Bell Laboratories mathematician, formulated the information theory, which, among other things, described the number of "bits" of information that can be transmitted in a communications channel.

Independent development continued on electronic business machines (including computers) and on data sets that would transmit information received from business machines across telephone or other communications facilities to similar business machines located anywhere in the United States. Now awaited was a need to combine these separate developments into a single data-communications system.

This need finally took the form of a top-priority defense problem. The time was the early 1950's. America's system of spotting . . . identifying . . . and intercepting supersonic enemy aircraft had suddenly become too slow. It was essential that we find a means of transmitting information at jet-age speeds. The Air Force asked Bell Laboratories to design a device that would transmit "bits" of information at a fraction of the time it takes humans to talk.

Western Electric's Merrimack Valley Works produced prototype models, and successful tests were held over Bell Telephone Company line facilities.

By 1958, as a result of teamwork among Bell System companies, data sets were beginning to re-vitalize America's air defense. Today these sets transmit radar signals from early-warning outposts in the Arctic to 21 SAGE (Semi-Automatic Ground Environment) Direction Centers, located throughout the United States. There, computers help identify enemy aircraft and solve complex problems connected with intercepting them.

In the long run, experience gained in SAGE helped in the development of DATA-PHONE service. For, in meeting the nation's early-warning defense needs, the Bell System proved (a) that data sets could accept information from electronic machines and convert the information into a form suitable to send over ordinary telephone circuits, and (b) that these circuits could carry machine-talk as reliably as they have been carrying the human voice.

PIONEERING DATA-PHONE SERVICE AT W. E.

Having demonstrated the capabilities of DATA-PHONE tranmission, Bell System engineers undertook to increase the kinds of data sets and supporting equipment in use. Each new version would be designed to meet different needs and, as a result, help data communications reach its fullest potential.

In 1958, under direction of Laurin L. Sevebeck, Superintendent of Data Processing Developments and Methods in the Distribution Organization, a three-man Western Electric team, developed data-set equipment to facilitate ordering procedures followed by W.E. and its Telephone Company customers.

Equipment developed by the Sevebeck group included a data set card reader as well as transmitter and receiver sets. Like earlier models, these sets converted "bits" into audio tones for transmission over telephone lines.

The card reader could identify several bits of information simultaneously, not just one at a time. The transmitter and receiver, by handling these bits on two-voice frequencies at once (parallel transmission), produces a code for ordering many different kinds of stock items over the regular switched telephone network. This new use of data transmission via the regular telephone network was called DATA-PHONE service.

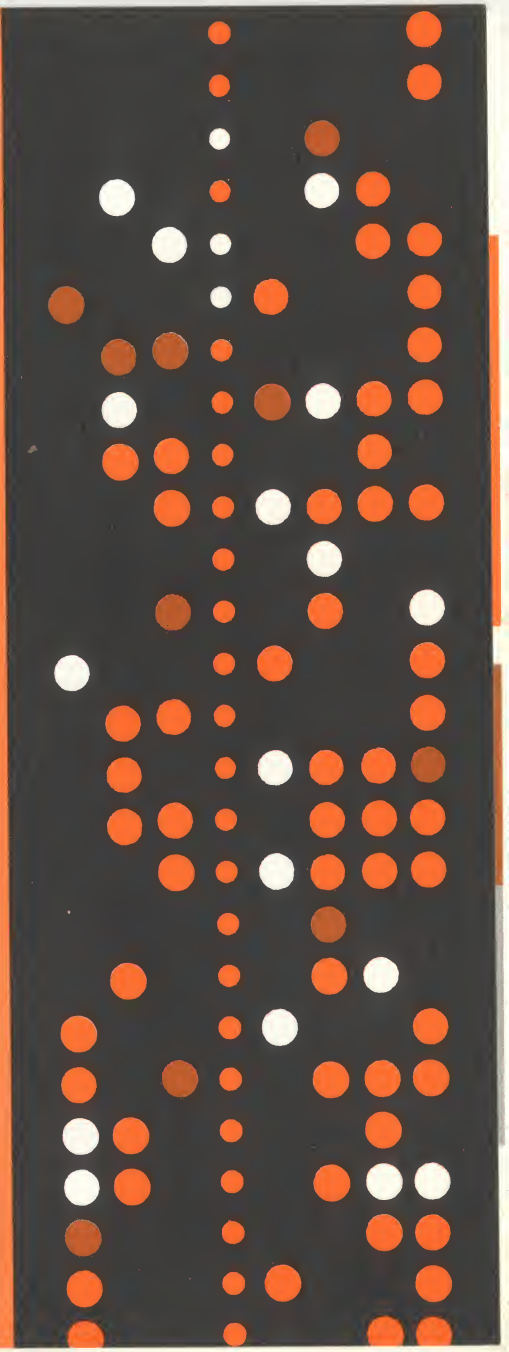
With the development of parallel transmission, the Sevebeck group introduced card readers and data-set equipment similar to those that are now being used commercially in increasing numbers.



■ Laurin L. Sevebeck, flanked by P. J. Grunfelder (L) and M. V. Di Iorio (R), exhibiting artifacts that trace the development of the card reader from wired breadboard to production model. Their work at Headquarters in 1958 resulted in a new line of data-set equipment now gaining widespread commercial use.

BITS . . . the language of business machines

Each position on this seven-level punched tape (whether punched or not) represents a "bit," which is a business machine's decision to produce a mark or a space. "Bits" are the simplest element of information used in data transmission. Each horizontal arrangement of "bits" (at right) composes a character —a letter or a number. Characters build words; words form messages for transmission.



WHAT'S AHEAD FOR DATA SERVICE?

From all indications, data transmission is the fastest growing segment of the communications industry. Here are a few of the key developments:

■ Faster, more efficient service for Dial TWX (Teletypewriter Exchange Service) subscribers. Some 54,000 TWX customers —using teletypewriters recently equipped with new data-transmitter-receiver sets— cut over from "operator" to direct dialing on August 31, 1962. Like regular telephone users, DTWX customers dial "operator" only for assistance and services like "information." Data sets used in connection with teletypewriters are manufactured at the Montgomery Plant in Aurora, Illinois.

■ An increase in production capacity for data sets, other than those used with teletypewriters, from 8,000 to 14,000 sets per year at the Merrimack Valley Works.

■ A trend toward smaller and more attractive data sets. Tiny transistorized parts and improved, more compact circuitry are being utilized in new models. Sets for DATA-PHONE service now look more alike in color and design. The tasks they can perform depend on the different component parts installed under their "hoods."

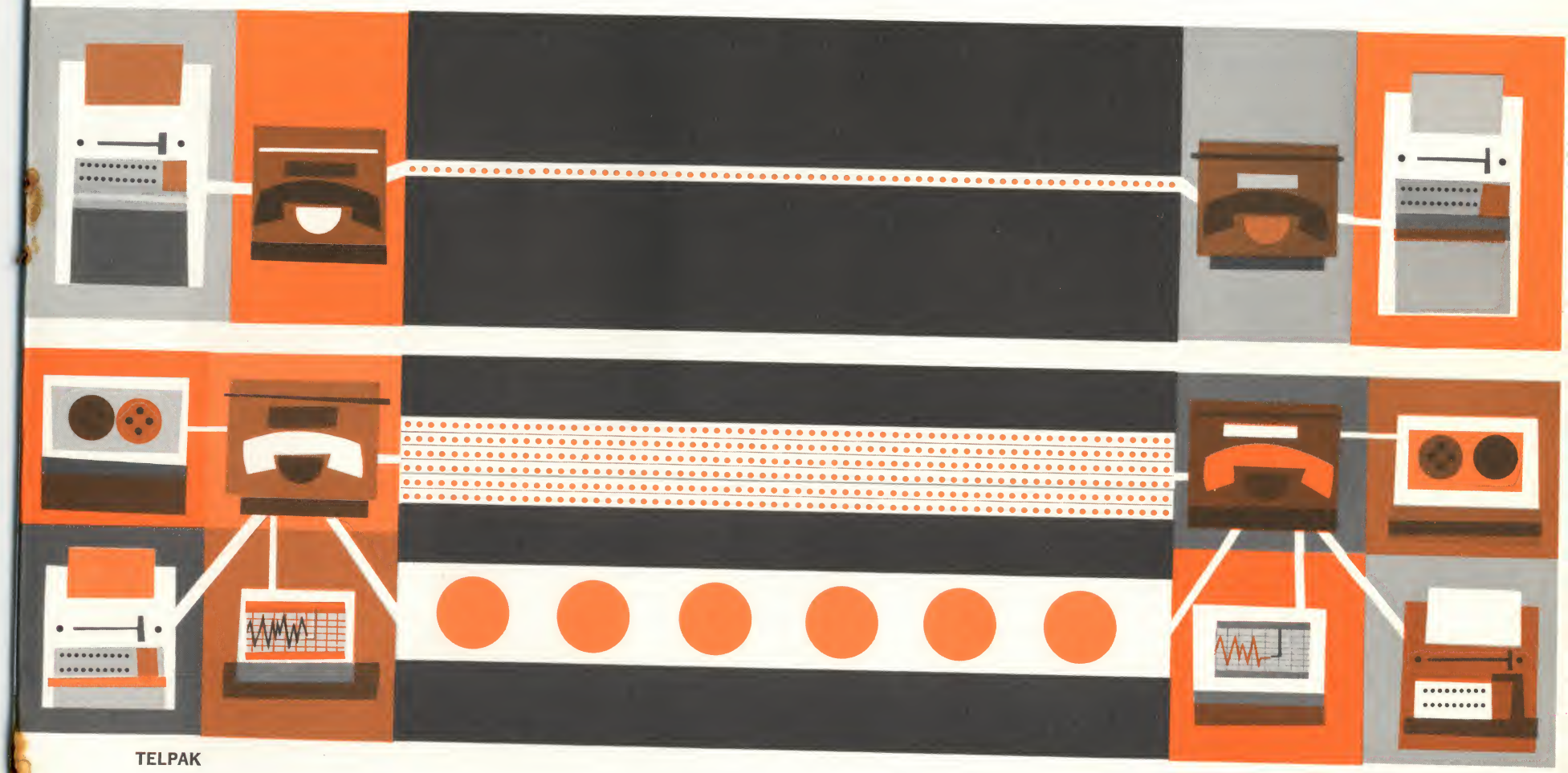
Teletype Corporation manufactures related equipment that advances the uses and economy of DATA-PHONE service. The equipment, called DATASPEED, can transmit and receive as many as 1,050 words per minute on punched tape. DATASPEED tape senders and receivers enable a customer to collect data during the working day and transmit it, with the help of medium speed data sets, during night hours when rates are lowest. As a result, customers may exchange more data in less time and at minimum rates.

TELPAK AND WADS

Subscribers with heavy volumes of information to transmit may use high-speed sets with private-line connections under a service provided by A.T.&T. known as TELPAK. These privately leased lines form broad data communications "highways," the largest of which can carry more than one-half million words per minute (enough for about six full-length novels).

Data sets, similar to those produced for DATA-PHONE service, are manufactured and used in WADS (Wide Area Data Service), a new flat-rate data service. WADS is available—subject to final FCC approval—to several kinds of subscribers, including those who use these data sets with teletypewriter equipment.

WADS



TELPAK

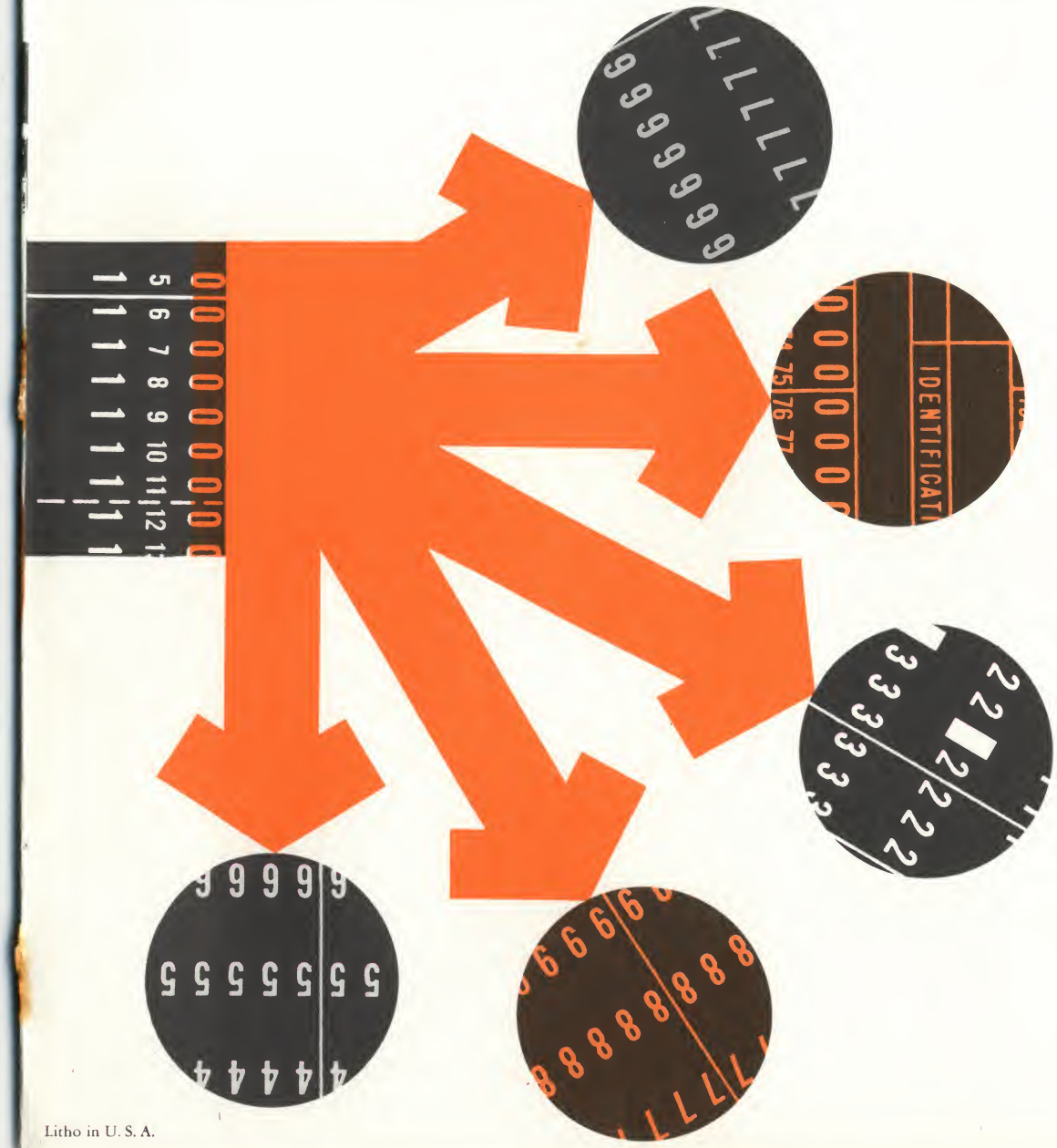
OTHER NEW FEATURES

These are just a few examples of the flexibility built into Western Electric's data communication equipment; there are countless others. For example: many data sets can operate while unattended and then automatically disconnect. Soon data sets used with DATA-PHONE service will automatically place calls, too. Some sets can receive as well as transmit, and several models can do both simultaneously. DATA-PHONE service speeds currently range up to 2,000 bits per second over regular network telephone lines. A new series of data sets under development will provide speed up to about 40,800 bits per second on wideband channels.

What's more, the demand for data communication service is increasing rapidly as new potentialities and new uses develop. In this new field, as in voice communications, the Bell System's ability to anticipate the needs of the public is enhanced by the close working relationship of its research, manufacturing and operating units. One example of this teamwork is the Bell System's data communications school at Cooperstown, N. Y., where selected people from Western Electric, Bell Laboratories and the telephone companies are preparing to cope with the most advanced problems of data transmission. There, students average 55 to 60 hours of class, laboratory and homework per week. The case study method of learning is used extensively. Bell System instructors outline problems actually faced by DATA-PHONE service customers and students propose solutions. Engineers, meanwhile, tackle more technical problems amid fully equipped laboratory surroundings.

This 12-week course is expected to continue into 1963, when the number and calibre of Cooperstown graduates should be sufficient to meet future demands for leadership in all forms of data communication service.





DATA IN THE HOME

As data sets come into general use, they'll be compact, colorful companions for anyone's telephone.

Imagine dialing a supermarket . . . and ordering the kind and number of items you'd like to buy with a coded card.

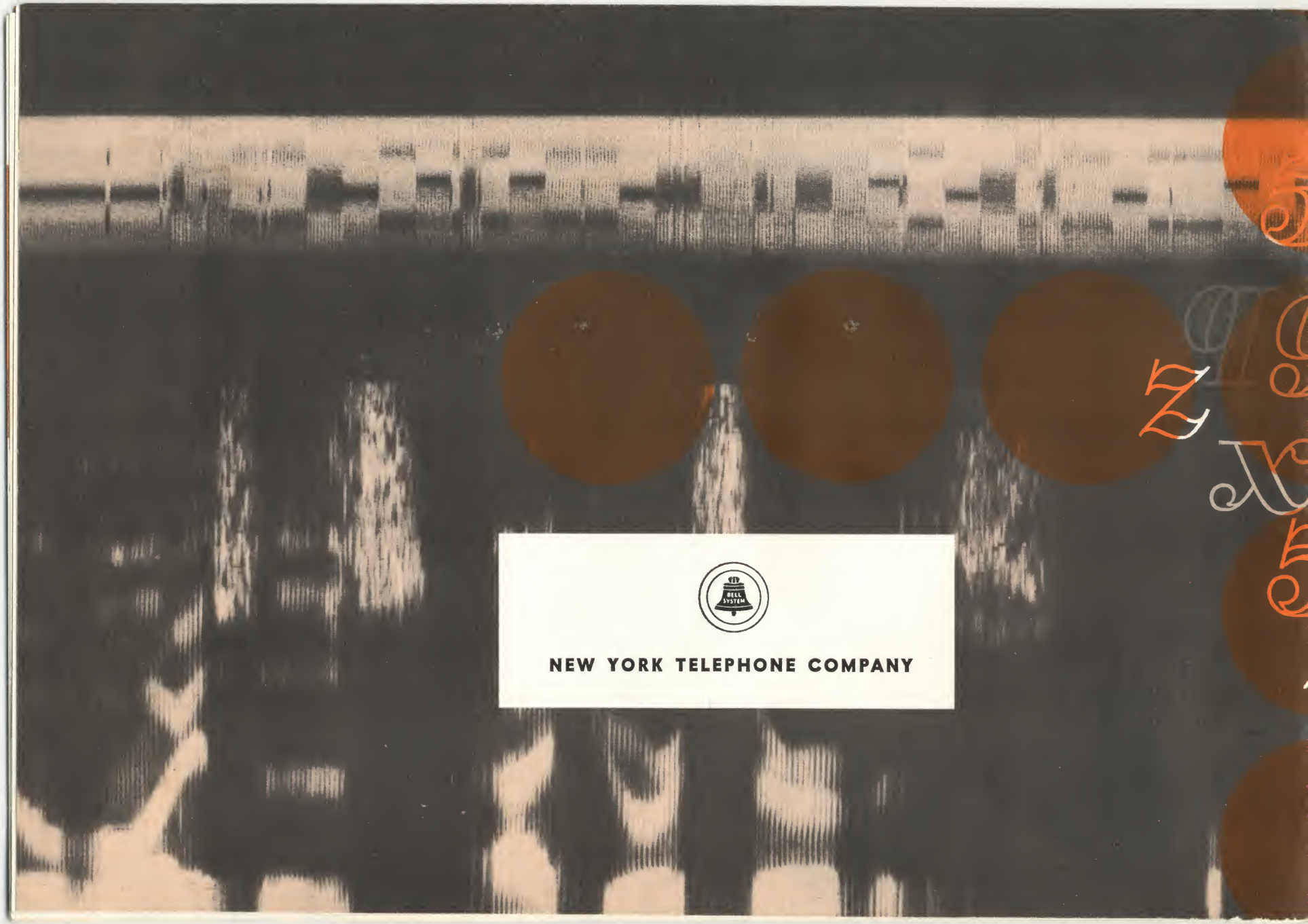
Or, when bills fall due, imagine dialing the bank and instructing the teller—via DATA-PHONE service—to debit your account and credit the supermarket—or the furniture store, the travel agency and others with whom your family trades.

A DATA-PHONE booth may permit you to dial home and instruct your electric oven to begin cooking the roast you'd put into it hours beforehand.

A DATA-PHONE system may serve you as an alarm against fire, water leakage or burglars; it may even serve as an automatic meter-reader.

DATA-PHONE service promises to benefit every broad area of human concern.

Litho in U. S. A.



NEW YORK TELEPHONE COMPANY

DATA·phone Service



New DATA-PHONE
Service cancels
time and
distance!
Sends facts
and figures at
SUPER-PHONIC
SPEEDS!



WHAT IS DATA-PHONE SERVICE?

The Bell System's new concept in data transmission — for machines using punched cards, tape or magnetic tape.

- Sends data from one machine to another
- Across town or across the nation
- Over regular telephone lines.

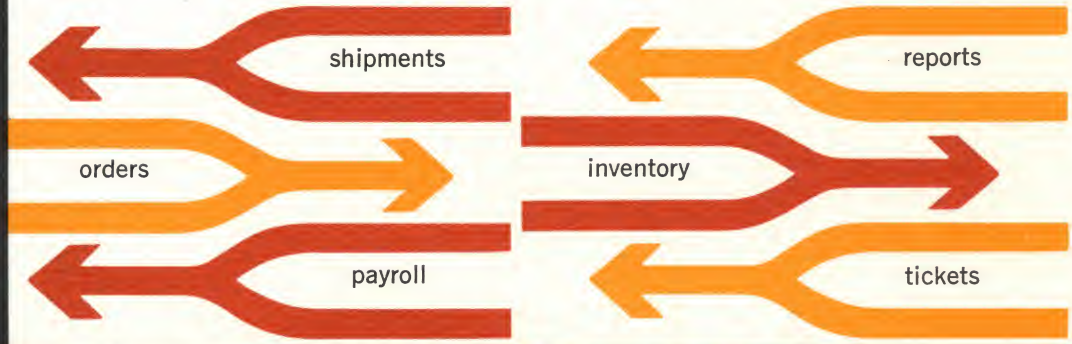
WHAT DATA-PHONE SERVICE CAN DO FOR YOU

It can send facts and figures faster than ever before . . . with efficiency so great it will pay for itself over and over!

Here are some ways to use it for profit:

- Collect sales reports every day — or every hour if needed
- Get up-to-date inventory information from many points
- Transmit buy or sell orders instantly
- Deliver tickets or reservations immediately
- Control shipments, truck or freight car movements
- Collect payroll or production figures faster than ever before

Other uses of DATA-PHONE Service are being discovered almost every day wherever facts and figures must be transmitted quickly between two or more points.





DATA-PHONE SERVICE GIVES THESE DAILY OPERATIONS SUPER-PHONIC SPEED

Accounting • Administration
Credit and Collections • Finance • Insurance
Inventory • Management • Marketing
Payrolls • Production • Purchasing
Reservations and Tickets • Sales
Schedules • Shipping • Telemetering

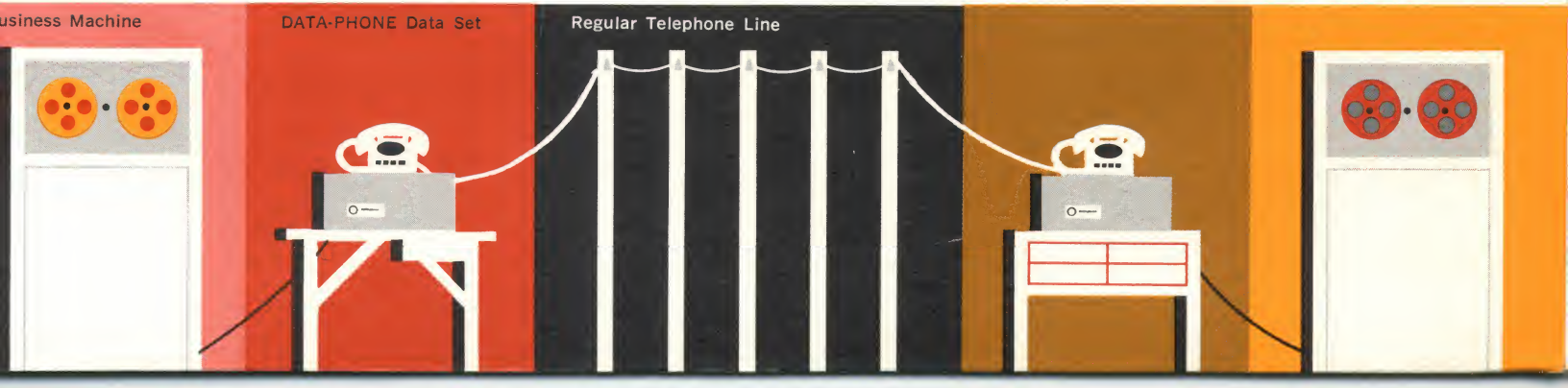
DATA-PHONE SERVICE OPERATION IS AS EASY AS MAKING A TELEPHONE CALL

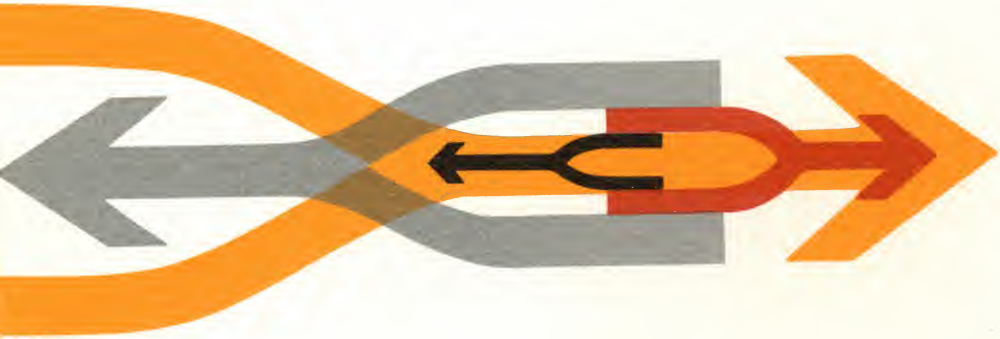
To put it to work for you, decide which operations in your business can benefit most by fast transmission of facts and figures. Experienced telephone company salesmen can help you with this.

Then consult with manufacturers of business data machines — or with us for teletypewriters — to decide which machines can best meet your needs.

The Bell System has worked closely with many manufacturers, developing DATA-PHONE data sets to match and work with various data machines available.

These sets take pulses from punched card or tape data machines and transform them into tones that are sent over telephone circuits. One set is placed near the data machine at the sending office, with another at the receiving office. You then have a basic set-up as follows:





This provides either one- or two-way transmission between two points. For communication to and from other points, the basic set-up can be expanded. Some firms might need a nationwide network of machines "talking" to each other—or many machines feeding data into a central point. Smaller companies can have a simple two or three point system.

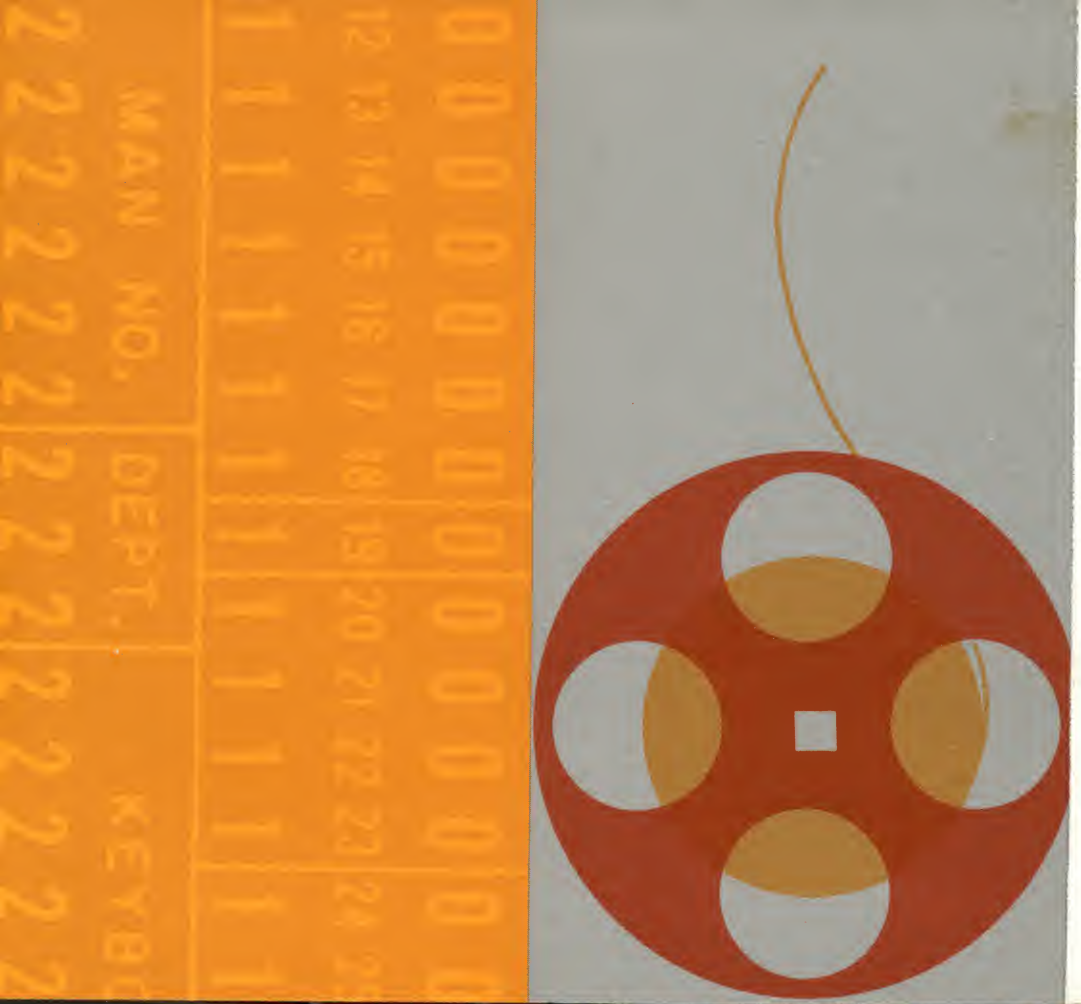
COMPLETE FLEXIBILITY TO MEET YOUR NEEDS

You can get as much or as little DATA-PHONE Service as your business needs. You can connect your machines wherever there are telephones — practically everywhere! You pay for the line only while you use it. Many companies send data at night when Long Distance rates are especially low.

DATA-PHONE Service can transmit any business machine code — from punched cards, paper tape or magnetic tape. It can serve you any time, anywhere, at any speeds up to 2000 "bits" per second for whatever length of time you require.

Depending on your need, DATA-PHONE data sets may also be used on leased private lines or combined to work alternately on regular telephone or private lines.

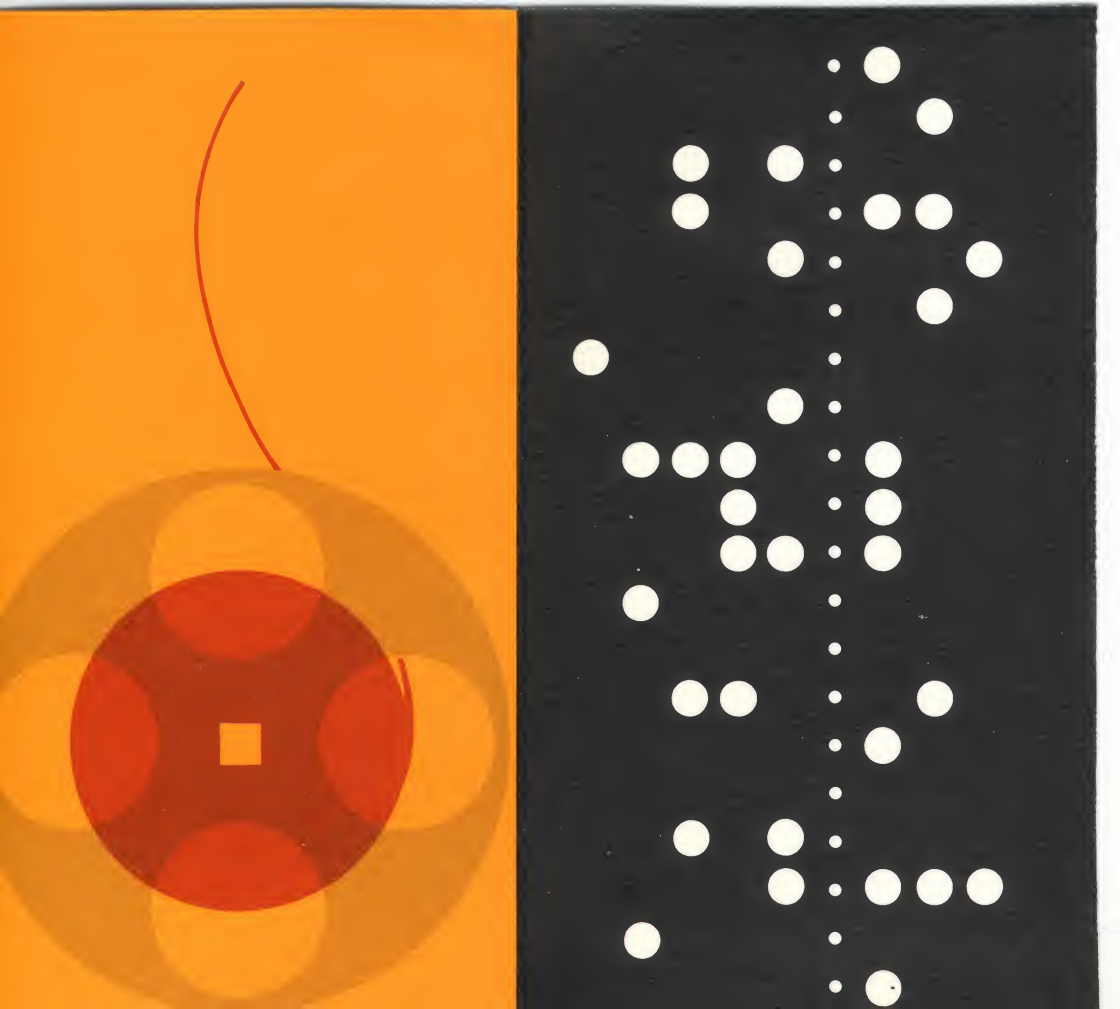
Your Telephone Company sales representative can help you choose the service you need. Call your Telephone Company Business Office for an experienced telephone representative to work with you.



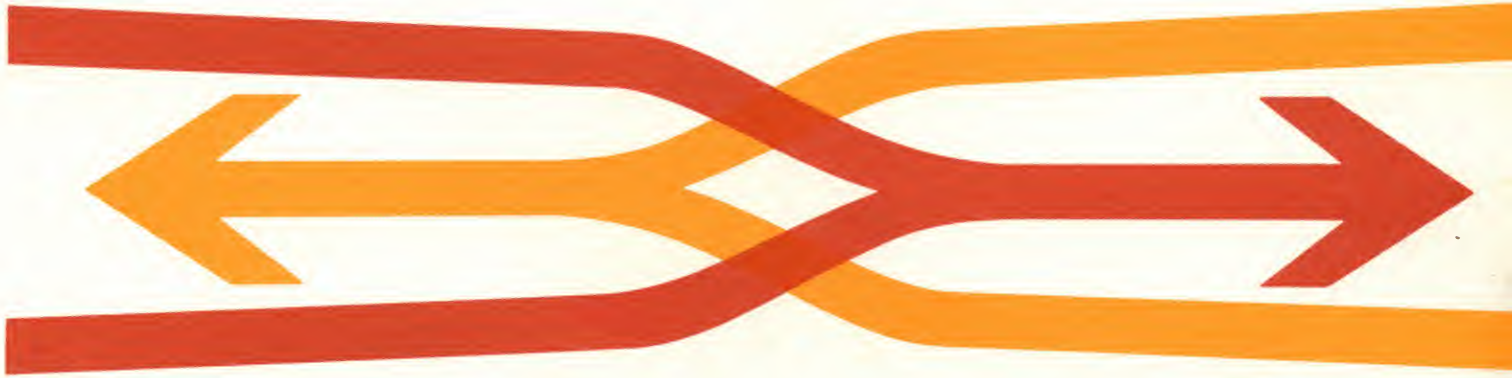
DATA-PHONE Service offers your business faster transmission of facts and figures than ever before!

DATA-PHONE Service is dependable, flexible...can pay for itself over and over.

Get the facts about DATA-PHONE Service today!



DATA·phone Service



Form SP-24 Litho in U.S.A.—4/62